

Photonic Robots, Phase I

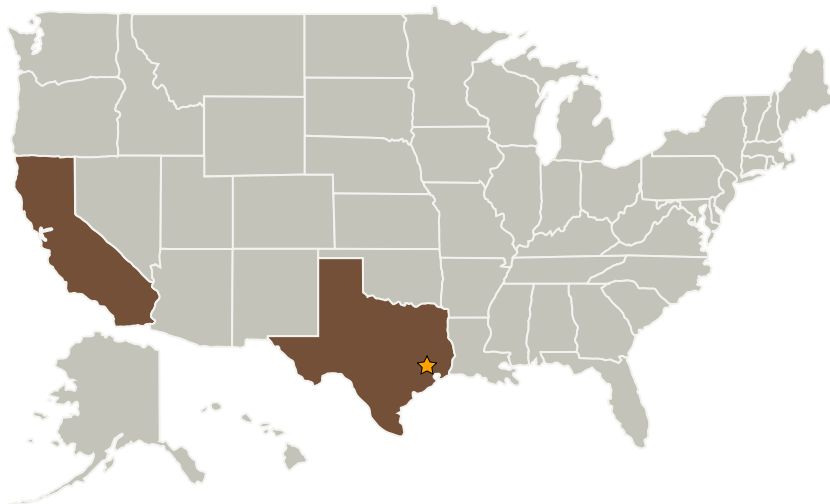
Completed Technology Project (2005 - 2005)



Project Introduction

To operate complicated tools and perform intricate repairs requires a manipulator of great precision and excellent coordination. An instrument such as the human hand is a perfect example; it is an organ for the reception of and reaction to tactile stimuli, a perception that guides the repertoire of manual functions. However, the integration of an analogous sensing suite into a robotic platform poses a major technological challenge. The "smart skin" solution IFOS proposes is 2-D sensor based on the integration of high-sensitivity embedded Fiber Bragg grating (FBG), a custom engineered composite material - Nano Particle Material (NPM) ? and data interpretation and on-board decision-making. This sensor will support multi-point strain sensing to control the force exerted by robot end-effectors or manipulators on an object, required by such operations as assembly, surface-machining and cutting. Our goal is design and control of an anthropomorphic manipulation prototype based on high-resolution artificial taction. Optical sensors promise particular advantages for a robot that can achieve high-fidelity force control and that can operate safely in contact with astronauts. FBG sensors are robust, highly accurate, and immune to electromagnetic interference. A network of such sensors can be integrated directly into the structure or skin of an anthropomorphic robot.

Primary U.S. Work Locations and Key Partners



Photonic Robots, Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Photonic Robots, Phase I

Completed Technology Project (2005 - 2005)



Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Intelligent Fiber Optic Systems Corporation	Supporting Organization	Industry	Santa Clara, California

Primary U.S. Work Locations	
California	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Behzad Moslehi

Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.3 Manipulation
 - └ TX04.3.1 Dexterous Manipulation